Perry. Is it not surprising that a method which Prof. Perry himself considers very important should have to reach England from Germany by the circuitous path of the United States?

The reorganisation of technical education in England has occupied the wisest men in England for the past thirty years. It seems to be of so much importance that it has been made the subject of Sir Norman Lockyer's recent presidential address before the British Association. It seems to me that a plea might well be made for the acquisition of a reading knowledge of modern languages, especially French and German, in the advanced public schools. Prof. Perry re-discovered in an American paper, eighteen years after its first publication, a very important method for constructing a curve continually used in thermodynamics. Nineteen years ago Prof. Herrmann originated and described the entropy diagram, so often attributed to Mr. Macfarlane Gray, through whose admirable paper, read in 1889, the entropy diagram has since come into general use. There are a number of similar cases which might be cited in favour of the cultivation of a reading knowledge of those modern languages which are apt to contain valuable contributions to scientific knowledge. Forty-three years ago Prof. Huxley wrote, "What is it that constitutes and makes man what he is? What is it but his power of language—that language giving him the means of recording his experience—making every generation somewhat wiser than its predecessor—more in accordance with the established order of the universe? What is it but this power of speech, of recording experience, which enables men to be men. . . ." We might paraphrase Huxley's words and apply them to the advantage that a knowledge of the modern languages gives its owner in regard to utilising the experience of other men and nations.

B. A. BEHREND.

Station H, Norwood, Cincinnati, Ohio, October 26.

IT was of very little importance to me to find out whether the method was new; the important thing was that it was not generally known in England, that I, who read a good deal, had never seen the method, and that many of my friends who read French and German engineering books more than I do had never seen it. I may say without any contrition that there are useful things not only in French and German, but in Italian, Russian, and Chinese, as well as in English books unknown to me and to many other people, but surely this is not enough for an argument for the absolute necessity for a study of Chinese or German. Before our "advanced public schools" take up the study of French and German or Chinese, I should like to see them take up the study of English. In America and Scotland English is really well taught in many schools; this is not the case in England.

J. PERRY.

November 11.

## The Leonid Shower of 1903.

QUITE an abundant and attractive display of Leonids was observed here this morning (Monday, November 16). I began to watch the north-eastern sky at midnight (following November 15), and found meteors increasingly numerous. After 2 a.m. November 16, the numbers appearing in alternate intervals of fifteen minutes were as follows:—

| | h. | m. | | h. | m. | | Leonids |
|---|---|---|---|---|---|---|---|
| Nov. 16 ... | 2 | 0 | to | 2 | 15 | a.m. ... ... ... | 10 |
| | 2 | 30 | to | 2 | 45 | ,, ... ... ... | 14 |
| | 3 | 0 | to | 3 | 15 | ,, ... ... ... | 13 |
| | 3 | 30 | to | 3 | 45 | ,, ... ... ... | 13 |
| | 4 | 0 | to | 4 | 15 | ,, ... ... ... | 26 |
| | 4 | 30 | to | 4 | 45 | ,, ... ... ... | 34 |
| | 5 | 0 | to | 5 | 15 | ,, ... ... ... | 28 |
| | 5 | 30 | to | 5 | 45 | ,, ... ... ... | 42 |
| | 6 | 0 | to | 6 | 15 | ,, ... ... ... | 21 |

The horary rate of apparition for one observer was approximately as under:—

| | | | | Leonids |
|---|---|---|---|---|
| 0 | to | 1 | a.m. ... ... ... .. ... | 16 |
| 1 | to | 2 | ,, ... ... ... ... ... | 20 |
| 2 | to | 3 | ,, ... ... ... ... ... | 48 |
| 3 | to | 4 | ,, ... ... ... ... ... | 52 |
| 4 | to | 5 | ,, ... ... ... ... ... | 120 |
| 5 | to | 6 | ,, ... ... ... ... ... | 140 |

Maximum 5h. 30m. to 5h. 45m. a.m., when the rate was nearly three per minute.

The position of the radiant point was at 151°+22°, and it formed an area about 6 degrees in diameter. The great majority of the meteors, however, diverged accurately from the central part of the area.

During the minute following 3h. 44m. a.m. five Leonids appeared.

The meteors generally were very bright, and comparatively few were seen fainter than second magnitude. The more conspicuous objects were as follow:—

| Nov. 16 a.m | | | Mag. | | From | | | To | |
|---|---|---|---|---|---|---|---|---|---|
| h. | m. | | | | α | δ | | α | δ |
| | | | | | ° | ° | | ° | ° |
| 0 | 36 | ... | 1 | ... | 122 + | 24½ | ... | 103 + | 23½ |
| 1 | 13 | ... | 1 | ... | 119½ | 48 | ... | 97 | 53½ |
| 2 | 36 | ... | Sirius | .. | 117½ | 26½ | ... | 98 | 26¼ |
| 2 | 43 | ... | 1 | ... | 162 | 38½ | ... | 168 | 44 |
| 2 | 44 | ... | ♃ | ... | 73 | 72½ | ... | 17 | 63 |
| 4 | 4 | ... | 1 | ... | 168½ | 37 | ... | 186 | 45 |
| 4 | 12 | ... | ♃ | .. | 70 | 70 | ... | 19 | 59 |
| 4 | 37 | ... | ♃ | ... | 138 | 35 | ... | 133 | 39 |
| 4 | 45 | ... | ♃ | ... | 92 | 53 | ... | 68 | 52½ |
| 4 | 45 | ... | ♀ | ... | 138 | 12 | ... | 134 | 7½ |
| 5 | 11 | ... | 1 | ... | 213 | 29 | ... | 223 | 27 |
| 5 | 14 | ... | ♃ | ... | 173 | 40½ | .. | 190 | 47 |
| 6 | 5 | ... | ♃ | ... | 182 | 51 | ... | 195 | 55½ |

A few meteors were noticed from minor showers, two particularly interesting objects being:—

| a.m. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| h. | m. | | | | | | | | |
| | | | | | ° | ° | | ° | ° |
| 3 | 41 | ... | 4 | ... | 219 + | 63 | ... | 209 + | 61¼ |
| 3 | 59 | ... | 2 | ... | 178 | 19 | ... | 223 | 41 |

These moved very slowly, and probably belonged to radiants at 262°+62° and 147°−11° respectively.

I should be glad to hear of duplicate observations of any of the above, as it is desirable to compute their real paths if the necessary materials can be obtained.

Bristol, November 16. W. F. DENNING.

## Autophyllogeny in the Vine (Vitis).

I LATELY received from a neighbour a vine-leaf, taken from his own garden, exhibiting the uncommon phenomenon known as "autophyllogeny." A small green leaf had arisen from the midrib, near the apex of the central lobe, upon the upper surface of the leaf. The supernumerary leaf was sessile, and had its upper surface turned towards the corresponding surface of the primary leaf, in the same direction of growth. The leaflet appeared to be of the normal shape, but, owing to a slight malformation, it was not fully expanded, and I could not therefore entirely satisfy myself upon this point.

Dr. Masters, in his "Vegetable Teratology," cites instances in which supernumerary leaflets have been observed upon the upper surfaces of leaves of Heterocentron and Miconia, and upon the under surfaces of leaves of other plants, but I cannot find any record of their occurrence in the vine.

HERBERT CAMPION

Walthamstow, Essex.

## The "Dew-bow."

ON Wednesday and Thursday, November 4 and 5, fogs prevailed in this district and brought by mild winds great quantities of carbonaceous dust from over the town, which covered the surface of the top pond in Vernon Park with a dry film. On the morning of Friday, November 6, hoar frost covered the grass and walks; the film of dust on the pond was covered with a glistening coat of minute watery globules. At 11.20, standing with my back to the sun, I noticed a bright streak of light on the surface of the water, and on moving a few feet further saw that it was split up into the colours of the prismatic spectrum, and presented the appearance of the rainbow, as it appeared curved. There were two spectra, one fainter than the other. The phenomenon was visible for more than four hours, and I directed the attention of several gentlemen to it. In November, 1885, Mr. Thomas Kay, Moorfield, Stockport, saw a similar phenomenon on Lake Windermere, and pub-

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lished the observation. The things necessary to produce it appear to be:—(1) a dry film of dust on surface of water; (2) a layer of fine globules of moisture on the film; (3) a dead calm, that the globules be not shaken into coalescence; (4) the sun shining brightly at a low angle through a clear atmosphere.

EDWARD HEWITT.

Municipal Museum, Vernon Park, Stockport,
November 11.

## Weather Changes and the Appearance of Scum on Ponds.

IF the scum referred to (NATURE, November 5, p. 7) be organic in character—algal, for instance—it would contain bubbles of gases.

Would not these bubbles tend to enlarge, from the expansion of their contained gases, on a lowering of barometric pressure, and the mass, becoming specifically lighter, to rise?

"Platanus orientalis" says "any decided change of weather." The above explanation would hold good only for a change of weather indicated by a falling barometer.

H. J. GLOVER.

Stationers' School, Hornsey, N., November 6.

## Earthquake at Kashmir.

IT may perhaps be of interest to note (I do not find the fact recorded in NATURE) that on April 18, 1902, there was a sharp earthquake shock over North-west India and Kashmir, about 2.30 a.m. (local time).

O. ECKENSTEIN.

34 Greencroft Gardens, London, N.W., November 13.

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## A NEW THEORY OF THE SOIL.[1]

IT has long been recognised that the chemical composition of the soil affords a very imperfect index to its fertility, partly due to the fact that only recently have methods of analysis been devised to discriminate between the total plant food in the soil and that which is active and likely to be immediately available for the plant, but chiefly because the physical texture of the soil and its power of maintaining a supply of water to the growing plant is a much larger factor in crop production than its store of nutrient material.

But though the part played by the chemistry of the soil has doubtless been much exaggerated and requires to be studied more in connection with soil physics, it has been reserved for the chemists of the United States Bureau of Soils to deny its action entirely, and put forward a theory which considers all soils to be effectively the same from the chemical standpoint.

Briefly stated, the thesis developed in the *Bulletin* before us is as follows:—dissatisfied with the want of correspondence between the results of any of the methods of soil analysis in which the soil is attacked by either weak or strong acids, Dr. Whitney and his associates have fallen back on the aqueous solution obtained by shaking 100 grams of the soil with 500 c.c. of water and allowing it to stand for twenty minutes. For the rapid quantitative examination of the very weak solution thus resulting they have worked out various colorimetric methods, and in this way have been able to analyse several hundred soils of the behaviour of which in the field something was known.

From these results the authors come to the conclusion "that with occasional exceptions the composition of the soil solution and the concentration is about the same in all cultivable soils." "All our principal soil types, in fact, practically all cultivable soils, contain naturally a nutrient solution which varies within comparatively narrow limits with regard either to composition or concentration, and which is usually sufficient for plant growth. Apparently, therefore, all soils are amply supplied with the necessary mineral plant foods, and these plant foods are not in themselves a matter of such paramount importance to the agriculturist, for their supply as regards the plant is determined by the supply of soil moisture which the crop can obtain from the soil." The authors further suggest that fertilisers, if they have any effect in increasing the crop, do so in the main by altering the physical texture of the soil or by stimulating the root range of the plant. So novel a point of view from men with the experience of Dr. Whitney and his colleagues demands a careful consideration of the evidence in its support.

On the theoretical side the authors suggest that in the natural soil solution on which plants feed "the quantity of any constituent which can possibly enter the solution is . . . determined by definite equilibrium conditions with the but slightly soluble mineral from which it is derived . . . it may very well happen that the addition of comparatively small amounts of a readily soluble potassium salt to a soil would simply force back the dissociation and solubility of the potash minerals with no consequent gain of potassium to the soil solution." In support of this view the authors describe an experiment in which powdered potash felspar when shaken up with water is shown to yield a feebly alkaline solution, as indicated by phenolphthalein. On adding, however, a little soluble potassium salt the colour of the phenolphthalein is partly discharged, which the authors consider to indicate that some of the potash derived from the felspar has been forced back to the solid phase. We would suggest the consideration of another experiment; take a very weak solution of potassium phosphate, add a drop of phenolphthalein solution, and run in dilute alkali until a distinct colour appears; now add a little solution of some neutral salt, sodium or potassium chloride; the colour will again be partially discharged, although the salt added is strictly neutral.

In the latter experiment there is no question of the intervention of a solid phase; both experiments are, we think, equally explicable on the dissociation hypothesis, but the one does not bear the interpretation put on it by the American chemists.

Turning now to the analytical figures, we cannot agree that, except in a very general and average sense, they support the authors' case that the composition and concentration of the soil solution are about the same for all soils. Taking first of all the determinations of nitric acid, they are seen to vary within the widest limits, as is evident from the following summary of the results for four of the soils:—

| | No. of analyses | Nitric acid. Parts per million of dry soil | | Mean |
|---|---|---|---|---|
| | | Highest | Lowest | |
| Windsor Sand ... | 34 | 26·62 | 0·56 | 5·69 |
| Norfolk Sand ... | 98 | 23·76 | 0·67 | 3·81 |
| Leonardtown Loam | 62 | 62·00 | trace | 12·71 |
| Sassafras Loam ... | 80 | 38·40 | 0·50 | 7·79 |

Furthermore, if the number of the determinations falling within successive equal limits be plotted into a curve, the resulting figure is highly irregular, and shows nothing of the maximum about the mean which characterises the curve of error. The nitric acid figures are thus entirely opposed to the authors' thesis; they show no tendency to a constant value, but extreme accidental variations, *i.e.* due to factors independent of the classification here adopted. But in fact too

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[1] "The Chemistry of the Soil as related to Crop Production." By M. Whitney and F. K. Cameron. U.S. Department of Agriculture, Bureau of Soils, No. 22. Pp. 71. (Washington, 1903.)

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